

**MATH 251**  
Linear Algebra I  
*Winter 2025*

**Instructor:** Dr. N. Ben Ghorbel  
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**Class Schedule:** Mondays & Wednesdays, 16:15-17:30.

**Office Hours:** Mondays, 14:45-15:45 and Wednesdays, 12:00-12:45.

**Textbook:** *Linear Algebra*, by S. Friedberg, A. Insel and L. Spence, 5th Edition, Prentice Hall. The digital and print versions of the textbook will be available at:  
<https://www.bkstr.com/concordiastore/home>

**Note:** Students should order textbooks as early as possible, especially for print versions in case books are back ordered or there are any shipping delays.

**Note:** The 4th Edition of the textbook will suffice.

**Assignments:** Assignments are very important as they indicate the level of difficulty of the problems that students are expected to solve and understand independently. Students are expected to submit assignments weekly **as a single PDF file on the Moodle site**. Solutions must be written up carefully, showing all work for full credit. **Late assignments will not be accepted.**

**Midterm Test:** There will be one midterm test during lecture time in week 7 covering weeks 1-6. **Midterm test will be held on Wednesday, March 05, 2025, in class.**

**PLEASE NOTE:** It is the Department's policy that tests missed for any reason, including illness, cannot be made up. If you miss a test, the Final Exam will count for 85% of your final grade.

**Final Exam:** At the end of the course, there will be a final examination during the period assigned by Concordia's Exam Office.

**PLEASE NOTE:** Students are responsible for finding out the date and time of the final exam once the schedule is posted by the Examination Office. Any conflicts or problems with the scheduling of the final exam must be reported directly to the Examination Office, **not** to your instructor. It is the Department's policy and the Examination Office's policy **that students are to be available until the end of the final exam period. Conflicts due to travel plans will not be accommodated.**

**Final Grade:** The highest of the following: (15% assignments + 25% midterm test + 60% final exam) or (15% assignments + 85% final exam).

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

**Calculators:** Only calculators approved by the Department (with a sticker attached as proof of approval) are permitted for the class test and final examination. For a list of Approved calculators see <http://www.concordia.ca/artsci/math-stats/services.html#calculators>.

Week	Sections	Topics	Assignments
1. Jan. 13	1.2, 1.3	Vector Spaces, Subspaces	1.2: 18, 19 1.3: 10, 12, 17
2. Jan. 20	1.4, 1.5	Linear Combinations Systems of Equations Linear Dependence and Independence	1.4: 5(d, f, h), 6 1.5: 2(b, d, f), 8(a), 10
3. Jan. 27	1.6	Basis and Dimension	1.6: 3(b, d), 5, 8, 14, 30
4. Feb. 03	2.1	Linear Transformations, Null Spaces, Ranges	2.1: 3, 9(b), 11, 17
5. Feb. 10	2.2	Matrix Representation of Linear Transformations	2.2: 2(b, e), 4, 5(a, d, f)
6. Feb. 17	2.3	Composition of Linear Transformations, Matrix Multiplication	2.3: 3(a, b), 9, 11, 12(c), 13, 15
<b>February, 24 - March, 02: Reading Week</b>			
7. March 03		<b>Review Midterm Test</b>	
8. March 10	2.4, 2.5	Invertibility and Isomorphism	2.4: 6, 15, 2.5: 2(b, d), 3(f), 6(b, d)
9. March 17	3.1, 3.2, 3.3	Elementary Matrices, Rank of Matrices, Matrix Inverses, Systems of Equations	3.2: 2(f), 4(b), 5(h), 6(d, f), 20(a) 3.3: 2(d), 3(d), 6, 8(b)
10. March 24	3.4	Systems of Equations – Computational Aspects	3.4: 2j, 6*, 8, 10, 12 (*In question 6: Determine A if the first, third and <b>FIFTH</b> columns ...)

11. March 31	4.4, 5.1	Summary about Determinants Eigenvalues and Eigenvectors	4.4: 3(h), 4(h) 5.1: 3(d), 4(b, d), 5(c, d, g)
12. April 07	5.2	Diagonalizability <b>Review</b>	

### Student Services

You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: <https://www.concordia.ca/students/services.html>

### Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: <https://www.concordia.ca/conduct/academic-integrity.html>" [Undergraduate Calendar, Sec 17.10.2]

### Behaviour

All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the [Code of Rights and Responsibilities](#), which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

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